NOTES ON FLEAS IN THE K. K. HOFMUSEUM IN VIENNA.

By THE HON. N. CHARLES ROTHSCHILD, M.A., F.E.S.

(Plate IX.)

1. Echidnophaga ambulans Olliff.

Echidnophaga ambulans Olliff, *Proc. Linn. Soc. N. S. Wales* (2). i. p. 172 (1886) (N. S. Wales, off *Echidna hystrix*).

THERE are a number of females in the collection of the K. K. Hofmuseum which belong to a species not known to us when we published the "Revision of the *Sarcopsyllidae*" in the *Thompson, Yates, and Johnston Laboratories Report*, vii. (1906). This insect, we think, is the true *E. ambulans*. Mr. W. J. Rainbow has kindly sent us a sketch of the tarsi of the type-specimen of *E. ambulans* which proves that *ambulans* has two ventral apical bristles on the fifth tarsal segment like *gallinaceus*, and that this segment bears on each side two strong bristles and one thin one. The Vienna specimens, taken off *Echidna hystrix*, show the same character, and doubtless are the true *ambulans*. We give a figure of the fifth segment of the midtarsus on Pl. IX. fig. 9.

2. Echidnophaga myrmecobii spec. nov. (Waterhouse indescr.).

Sarcopsylla myrmecobii Waterhouse, *Proc. Ent. Soc. Lond.* p. 23 (1887) (nom. nudum, West Australia, off *Myrmecobius*).

Echidnophaga ambulans, Rothsch. & Jord. (nec Olliff, err. determ.), *Thomps., Yates & Johnst. Labor. Rept.* vii. p. 54. n. 6 (1906) (N. S. Wales, Victoria, W. Austr., off *Trichosurus vulpecula*, *Bettongia lesueuri*, *Diamenia superciliosa*, *Myrmecobius fasciatus*, *Paragale lagotis*).

This insect was erroneously identified by us as *ambulans* (see above). We accept for it the name introduced by Mr. Waterhouse, making our ♂ off *Trichosurus* from Sydney the "type."

E. myrmecobii agrees very closely with *E. gallinaceus*, differing from the latter in having only one ventral apical bristle on the fifth tarsal segment instead of two.

3. Ceratophyllus flaveolus spec. nov. (Pl. IX. fig. 6.)

Allied to *C. gallinae* Schrank (1804); smaller and much paler. Only one ♀ known.

Head.—The frons bears 3 bristles in front of the eye and a row of 4 smaller ones before them. On the occiput there is one bristle behind the base of the antenna and two more above the middle of the antennal groove, besides the usual subapical row.

Thorax.—The comb of the pronotum consists of 32 spines.

Abdomen.—The tergites bear two rows of bristles and a few additional hairs in front of the rows, the number of bristles being on the first tergite 15 in the anterior and 13 in the posterior row, the second tergite bearing 19 bristles in each row. The first sternite has 7 bristles on each side, the following four sternites each bearing a row of 5 to 8 bristles on each side and 5 to 10 bristles in front of the row. The sternite of the seventh segment has a row of 8, in front of which there are more than 20 bristles. The antepygidial bristles are longer than in *gallinae*, and the central one of these bristles is only a little over twice the length of the other two. The seventh sternite (Pl. IX. fig. 6) is produced into a pointed lobe, as shown in the figure.

Legs.—The hindfemur has a row of 8 bristles on the inside, and the hindtibia about 18 bristles on the outer surface exclusive of the bristles situated at the apex, the inside bearing a row of 8 or 9 bristles.

Modified Segments.—The eighth tergite (Pl. IX. fig. 6) bears about 20 long and 14 shorter bristles on the outer surface, 3 or 4 long ones being placed beneath the stigma. The stylet is shorter than in *gallinae*, the two lateral bristles being placed a very little beyond half-way between the base and the apex.

One ♀ off *Mustela erminea*, collected by von Frauenfeld, probably in the neighbourhood of Vienna. The occurrence of this insect on *Mustela* is doubtless accidental, as the species is a true bird-flea.

4. **Ceratophyllus phaulius** spec. nov. (Pl. IX. fig. 8).

Likewise a bird-flea. There is in the collection only one very pale and apparently immature ♀, which moreover is imperfect. The specimen exhibits some interesting distinctions, and we therefore do not hesitate to describe it.

Head.—The frons bears two rows of bristles. The posterior row, which is placed in front of the eye, contains 3 bristles, of which the central one is the shortest, while the anterior row consists of 5 short thin bristles. The occiput has no bristle behind the base of the antennal groove, but one long one and a short one above the centre of the groove. The long ventral bristle of the subapical row is separated from the bristle situated above it by a wide interspace. Below this ventral bristle there is a short slender one.

Thorax.—The pronotal comb consists of 28 spines.

Abdomen.—The first and fourth tergite bear on each side 2 slender pale apical spines. There are 3 antepygidial bristles on the seventh tergite, the middle one being long and the other two very short. The basal sternite has one ventral bristle on each side, the following three sternites bearing 3 bristles, and the sternite of the sixth segment 4 or 5 on each side. The sternite of the seventh segment has the apical edge unfortunately torn on both sides, so that it is impossible to describe the outline. This sternite bears a row of about 6 bristles, and in front of the row about 7 more bristles on each side.

Legs.—The hindfemur bears a row of 6 bristles on the inside and one subbasal and one subapical bristle on the outside.

Modified Segments.—The eighth tergite (Pl. IX. fig. 8) bears 4 long bristles at the apical margin and about 10 moderately long and 12 short ones on the lower portion of the outer surface, there being also several bristles below the stigma (not shown in the figure). Inside the eighth tergite lies the ninth sternite, which in this species bears more bristles at its edge than in any other species we are acquainted with (cf. fig. 8, ix. st).

We have one ♀ found in the nest of *Cotile riparia* at Stockerau, Lower Austria, by Herr Bernhauer. There was also a ♀ of *Ceratophyllus dalei* in the same tube, and the occurrence on *Cotile* is no doubt accidental.

5. **Ceratophyllus frontalis** spec. nov. (Pl. IX. figs. 1—5).

A very dark species, which is unlike any other described *Ceratophyllus*.

Head.—The frons bears a very strong tubercle in both sexes (Pl. IX. figs. 1, 2) and two rows of bristles as shown in the figure. The occiput has three rows of bristles inclusive of the subapical row, the anterior row containing less bristles in the ♀ than in the ♂. The rostrum does not reach to the apex of the forecoxa.

Thorax.—The pronotum has a comb of 32—34 spines. The meso- and metanotum are very hairy, bearing three or four irregular rows of short bristles in front of the postmedian row of long bristles. The epimerum of the metathorax has 10 to 12 long bristles and a few minute hairs.

Abdomen.—The tergites are dorsally minutely denticulate, like the thoracic tergites, the four first tergites bearing moreover some apical spines, like the metanotum. They bear three rows of bristles, the first tergite having some additional bristles in front. There are 3 antepygidial bristles on the seventh tergite. The middle one of these bristles is long, the other two being short in the ♂, while in the ♀ the upper is short and the lower one two-thirds the length of the central bristle. The basal sternite has a patch of bristles on the lateral surface and several bristles along the ventral margin. The sternites of segments three to six bear on each side a row of 3 or 4 in the ♂, and 6 or 7 in the ♀, besides a number of small hairs in front of the row. The seventh sternite of the ♀ is very deeply sinuate, recalling *C. gallinulae* Dale (= *newsteadi* Rothsch.); cf. Pl. IX. fig. 4.

Legs.—The hindfemur has a row of 7 or 8 bristles on the outer surface, besides some subapical lateral bristles, and a row of 6 bristles on the inner side. The mid- and hind-tibiae bear four more or less irregular rows of bristles on the outer surface. The tibiae and tarsi resemble those of *C. styx* Rothsch.

Modified Segments.—♂. The eighth tergite is smaller than in other bird-fleas and the sternite much larger. This tergite is produced behind the stigma into a rounded lobe, which bears about 6 very long bristles, and at the apex about 5 additional smaller ones. The eighth sternite (Pl. IX. fig. 5) is rounded and is densely covered with numerous bristles. The process of the clasper is broad and at the apex rounded (Pl. IX. fig. 4, P). The movable process is very large (Pl. IX. fig. 4, F), being broadest at the apex. It bears a short stout spine at the upper distal angle on the inside. The ninth sternite is long and slender, and lies concealed in the eighth sternite.——♀. The eighth tergite bears about 12 small bristles above the stigma on each side, about 9 small and 6 long ones beneath the stigma, and between this patch and the ventral margin about 10 large and 24 small bristles. The inner surface of this segment bears some 5 short and stout bristles. The apical edge is short and bisinuate. The stylet resembles that of *gallinae* in bearing the two lateral bristles in the apical fourth.

Length: ♂ 3, ♀ 3·4 mm.

A long series of both sexes taken from the nest of the Alpine Chough (*Pyrrhocorax alpinus*), no locality being mentioned.

6. Ceratophyllus dalei Rothsch. (1903).

C. d. Rothsch., *Entom.* xxxvi. p. 297. t. 1. fig. 1—3 (1903).

There is a long series of both sexes in the collection obtained by Heger, neither host nor locality being mentioned. Also one ♀ found by Herr Bernhauer in the nest of *Cotile riparia* at Stockerau, Lower Austria.

7. Ceratophyllus turbidus spec. nov. (Pl. IX. fig. 7.)

A single ♀, related to *C. mustelae*.

Head.—The frons has a row of 3 long bristles before the eye, and farther frontad another row of 6 smaller ones. The occiput bears one bristle behind the base of the antennal groove, and a row of 3 above the centre of the groove, besides the subapical row of 6. The bristles of the second segment of the antennae are much shorter than the club. The rostrum does not quite reach to the apex of the forecoxa.

Thorax.—The comb of the pronotum contains 20 or 21 spines. The epimerum of the metathorax bears 7 or 8 bristles (3 or 4, 3, 1).

Abdomen.—The tergites have each two rows of bristles, the first tergite bearing a few additional bristles in front. There are 3 antepygidial bristles on the seventh tergite, the middle one being long. The basal sternite has one ventral bristle on each side. The sternites of segments three to six have a row of 3 or 4 on each side, with one or two small bristles in front. The seventh sternite (Pl. IX. fig. 7) is bilobate, as shown in the figure, and bears a row of 5 or 6 bristles with about 5 smaller bristles in front.

Legs.—The hindfemur has but one lateral bristle on the in- and the outside, this bristle standing near the base, there being a subventral subapical bristle on both surfaces. The hindtibia has 12 bristles on the outer side arranged in two rows, besides some ventral bristles. The longest apical bristles of the first and second hindtarsal segments do not reach the apex of the second and third segments respectively.

Modified Segments.—♀. The eighth tergite (Pl. IX. fig. 7) bears 2 long bristles beneath the stigma, 4 long ones at the apical edge, 3 more above the ventral margin, and 1 long and 3 or 4 short ones on the lower portion of the lateral surface. The stylet is a little over twice as long as it is broad. The ninth (internal) sternite bears apparently only one short bristle.

One ♀ without host and locality, but doubtless from Austria.

8. **Goniopsyllus kerguelensis** Taschenb.

Pulex kerguelensis Taschenberg, *Notes Leyden Mus.* i. p. 169 (1880); id., *Die Flöhe* pp. 67 and 123. t. 2. fig. 12. ♀ (1880) (Kerguelen, off *Pelecanoides urinatrix*).

Goniopsyllus kerguelensis Baker, *Proc. U. S. Nat. Mus.* xxix. p. 128 (1905); Jord. & Rothsch., *Parasitology* i. p. 93. t. 4. fig. 2, t. 7. fig. 11 (1908) (Kerguelen and Antipodes).

The collection of the K. K. Hofmuseum contains a ♀ of this species in good condition, taken off "Sturmvogel" on Kerguelen Island. The specimen agrees with the original ♂♀ preserved in the British Museum.

In our paper quoted above we said the ♀ possibly had two receptacula seminis. We now clearly see from the specimen in the Vienna Museum that there is only one receptaculum.